

IN THE CLAIMS

1. (currently amended) A computer-implemented method for determining routing feasibility of routing solutions for a plurality of nets, each net having an associated set of one or more routing solutions, each solution using one or more routing resources, comprising:

generating a first Boolean function with variables representing respective net/solution pairs, wherein each net has an associated set of one or more routing solutions, at least one of the nets has a plurality of routing solutions, and the first function evaluates to true if there exists a set of values for the variables such that at least one of the variables for each net is logically true;

generating a second Boolean function using the variables that represent the net/solution pairs, wherein the second function evaluates to true if there exists at least one set of values for the variables such that no resource is used by more than a predetermined number of nets; and

outputting a signal indicating whether there exists at least one set of values for the variables for which the first function and the second function evaluate to true.

2. (original) The method of claim 1, further comprising representing the first and second Boolean functions in conjunctive normal form.

3. (original) The method of claim 2, further comprising applying Boolean satisfiability to first and second functions.

4. (original) The method of claim 1, wherein the resources comprise signal routing resources of a field programmable gate array.

5. (original) The method of claim 1, further comprising generating a net table including respective sets of solutions associated with the nets.

6. (original) The method of claim 5, further comprising generating the first function from the net table.

7. (original) The method of claim 5, further comprising generating a resource table including respective sets of net/solution pairs associated with the resources, wherein each net/solution pair associated with a resource represents usage of the resource by the net/solution pair.

8. (original) The method of claim 7, further comprising generating the second function from the resource table.

9. (original) The method of claim 1, wherein the predetermined number of nets that can use a resource is 1.

10. (original) The method of claim 1, further comprising saving as a routing solution the at least one set of values for the variables for which the first function and the second function evaluate to true.

11. (original) The method of claim 1, wherein if there exists no set values for the variables for which first and second functions evaluate to true, then performing the steps of:  
    modifying one or more selected sets of the routing solutions; and  
    repeating the steps of generating first and second functions and outputting the signal.

12. (original) The method of claim 11, further comprising adding additional sets of routing solutions.

13. (original) The method of claim 12, wherein the repeating step continues until predetermined criteria are met.

14. (currently amended) An apparatus for determining routing feasibility of routing solutions for a plurality of nets, each net having an associated set of one or more routing solutions, each solution using one or more routing resources, comprising:  
means for generating a first Boolean function with variables representing respective net/solution pairs, wherein each net has an associated set of one or more routing solutions, at least one of the nets has a plurality of routing solutions, and the first function evaluates to true if there exists a set of values for the variables such that at least one of the variables for each net is logically true;

means for generating a second Boolean function using the variables that represent the net/solution pairs, wherein the second function evaluates to true if there exists at least one set of values for the variables such that no resource is used by more than a predetermined number of nets; and

means for outputting a signal indicating whether there exists at least one set of values for the variables for which the first function and the second function evaluate to true.

15. (currently amended) A computer-implemented method for determining routing feasibility of a plurality of nets sharing a plurality of resources, comprising:

inputting respective sets of one or more solutions associated with the plurality of nets, at least one of the nets having a plurality of routing solutions, and each solution being associated with one or more required resources

assigning respective identifiers to net/solution pairs;  
generating respective Boolean liveness functions for the nets using the net/solution pairs;

generating respective Boolean exclusivity functions using the net/solution pairs for each resource required by two or more nets;

generating a routability Boolean function as a logical AND of the liveness functions and exclusivity functions; and testing whether the routability function can be satisfied.

16. (original) The method of claim 15, further comprising generating a net table including respective sets of solutions associated with the nets.

17. (original) The method of claim 16, further comprising generating the liveness functions from the net table.

18. (original) The method of claim 15, further comprising generating a resource table including respective sets of net/solution pairs associated with the resources, wherein each net/solution pair associated with a resource represents usage of the resource by the net/solution pair.

19. (original) The method of claim 18, further comprising generating the exclusivity functions from the resource table.

20. (original) The method of claim 15, further comprising representing the liveness and exclusivity functions and the routability function in conjunctive normal form.

21. (currently amended) The method of claim 15 ~~14~~ further comprising applying Boolean satisfiability to the routability function.